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ORTHOCHROMATIC AND ISOCHROMATIC PLATES.

BY STEPHEN H. HORGAN.

"IF you did nothing else for the remainder of your life but advocate the use of orthochromatic plates to the exclusion of all others, your time would be well spent." This is what Mr. Edward Bierstadt said to me recently; a gentleman, by the way, who through his researches and results on the subject leads as an American authority.

So then we will begin at the beginning, and in the briefest possible way consider—What is meant by orthochromatic plates, why they are not in more general use, who are the makers of such plates, and if there is any difference in their orthochromatic quality? All scientific terms will be avoided. Theories will not be considered, the subject being treated just as a professional or amateur would approach it to learn what advantage orthochromatic plates would be to him, and if there is any difference between the products of different makers.

In the first place, we can consider the terms orthochromatic and isochromatic as interchangeable or synonymous, as applied to sensitive photographic plates—the one means the reproduction of colors correctly as to their brightness to the eye; the other implies the proper relative luminosity of colors on reproduction; or in other words, the correct rendering in a negative of the

varying degrees of brightness or luminosity in a subject regardless of the colors it contains.

It is what wood-engravers have aimed to do, that is, to render in black or white or monochrome what they term the "tone values" of a painting, portrait or landscape. For this very reason the Century Company keep Timothy Cole, the distinguished American engraver, abroad, to engrave on wood before the frescoes and paintings of the masters, in order that he may record on his block the true orthrochromatic reproduction of those masterpieces.

Photography can render correctly the light, shade and contour of a plaster cast, or reproduce a black and white drawing, but when the subject before the camera contains color (as almost everything does), then is there misrepresentation. We all know how the golden-haired, blue-eyed little child, or the auburn-haired miss has been libeled. How bright green foliage becomes black masses in the photograph. How the blue sky is bleached white until the bright, fleecy clouds passing over it are indistinguishable; and it is needless to state that this is due to the darker colors, violet and blue, operating most powerfully on the photographic film, while the brighter colors, yellow, green, orange and red are weakest in their action. As all objects contain these colors in a greater or less degree, it is not too strong a statement to make that a correct representation is impossible through photography with ordinary plates.

I made a tour through all the photographic stockhouses in New York, recently, to purchase samples of all the orthochromatic plates in the American market. From the polite young clerks in these places I learned that the particular brand of plates they sold were the best made. When they were out of orthochromatics, I was told (but this in confidence), that all dry plates of the best makers were now made orthochromatic. Here was a photographic millennium! If all dry plates were orthochromatic, there would be no need of advocating their use, no others being obtainable, so I purchased four boxes of plates other than orthochromatic in the hope that this might, in some measure at least, be true.

Now to test the plates standard colors are necessary; the best I secure are those with which Prang furnishes the schools. With Prang's standard yellow, orange, blue, green, orange red and violet color papers, a star, ten inches in diameter, was designed. From this star negatives were made with each brand of plates. The light was that of an ordinary studio—the exposures were made in the middle of the day, as rapidly after each other as possible. An assistant developed the plates, and several trials of each plate were made to get the best time and development. The label on the end of each box of plates used was photographed with the charts, so that there would be no mistaking of the negatives afterwards. Unfortunately the half-tone cuts herewith do not show the gradations of tone in the original negatives. These gradations have been carefully recorded in the accompanying table, so that the results can be compared:

(*Vide table on next page.*)

The first line in the table shows approximately the orthochromatic relations of these six standard colors as they appear to the eye. The yellow, being the lightest, is designated as 1; and the violet, the darkest color, as 6. The orange is two shades darker than yellow, and is therefore numbered 3. Blue and green may be considered equally dark, and numbered 4, and red 5. So that an orthochromatic plate, to be correct, should, without a screen, show these standard colors in approximately the following order of brightness: yellow 1, orange 3, blue and green 4, red 5 and violet 6.

Now a glance at the table will show what relation the colors bore to one another, when photographed on the various plates, in every case without a color screen. In the first place it should be stated that the last four brands of plates are not sold as orthochromatic, and therefore should not be compared, except with each other. The Cramer "Banner" possesses the advantage in photographing the violet one shade darker than the Eastman, but this is offset by the Eastman plate recording the orange one shade brighter than Cramer's Banner, so honors are equal. The Seed and Hammer plates are identical, and photograph the yellow so dark that they can be called non-orthochromatic.

TABLE SHOWING THE ORTHOCHROMATIC PROPERTIES OF VARIOUS BRANDS OF PLATES.

	1	2	3	4	5	6	
The Proper Color Values, .	Y		O	B G	R	V	
Cramer's Slow Isochromatic, .	Y		O	B	G	R V	2 points incorrect.
Cramer's Medium Isochromatic,	B	Y		V	GO	R	10 points incorrect.
Forbes' Orthochromatic, . .	B	Y	V	O	G	R	10 points incorrect.
Carbutt's Orthochromatic, .	B	V	Y	O	G	R	12 points incorrect.
Wuestner's Orthochromatic, .	B	V	Y	O	G	R	12 points incorrect.
Lumiere's Series B, . .	B	V		Y O	G R		12 points incorrect.
Eastman's Extra Rapid, . .	B	V		Y O	G	R	13 points incorrect.
Cramer's Banner, . . .	B		V	Y	O G	R	13 points incorrect.
Seeds' Lens, 26, . . .	B		V		Y O G	R	14 points incorrect.
Hammer's, Extra Fast, . .	B		V		Y O G	R	14 points incorrect.

Of the six makes of orthochromatic plates interesting differences in qualities will be found. Cramer's slow isochromatic plates lead the others so far in orthochromatic properties that, as was said in the first international yacht race, "There is no second." Still, it must be noted that this plate is two points incorrect. It photographs the green and red in each case one shade too dark; this can be said in its favor, however, as well as in the favor of all the other plates, that Prang's standard green is too dark in color for a green. If this plate was a trifle too sensitive to the red it would be a perfect orthochromatic plate for use without a color screen. The other orthochromatic plates all photograph blue as the lightest color. Cramer's medium isochromatic and Forbes' orthochromatic give yellow the second place. Cramer in this plate again puts violet back one shade nearer its proper position, while Forbes' plate photographs orange the lightest, which leaves both plates still ten points incorrect. Wuestner's and Carbutt's possess like properties; violet, the darkest color, photographs lighter than yellow, the brightest, leaving these plates hardly deserving of the title orthochromatic. Lumiere's series B, advertised as especially sensitive to red and yellow, is the next plate; it is the only one that photographs red at its proper value. In every other respect it is no better than the others.

From a study of the table the value of orthochromatic or isochromatic plates can be readily seen. Speed was not considered here, because in photographing a painting, a costume rich in colors or a landscape, that question is not as important as the proper rendition of the color values. If any additional attention is drawn to the value of orthochromatic properties in dry plates, this article will not be in vain.

What Rings Cost.—"Have you any idea of the price of the most costly ring ever made?" asked Mrs. Watts, looking up from her paper, from which she had been reading about jewels.

"Dunno," answered Mr. Watts. "I know the one I put on your finger has been costing me from $2,000 to $2,500 a year ever since."

TEACHING A BEGINNER.

BY E. E. H.

MOST of us at some period or other have to take in hand the photographic education of a convert. It may be through seeing your own results, or on the advice of a mutual friend who lightly saddles you with the burden and responsibility of directing the steps of the beginner. This mutual friend, perhaps, is ignorant of all knowledge of the subject, and apparently thinks it can all be taught in a few hours. It depends very much on the pupil and also on the teacher whether the process is to be satisfactory or not.

The pupil is generally keen to learn, but something more is required for success to be reached. If he has a good memory and a mind adapted to the classification of the various processes, the teacher may feel thankful that he has been saved from the worry of trying to teach one who cannot keep the details of each process distinct.

There are three phases in the attitude of the pupil which have to be coped with by the teacher. The first might be called the stage of stupidity; the second is the aggravating stage, and the third is the ungrateful.

The first stage of stupidity, is quite natural; it is exemplified when the pupil is discovered trying to develop his plates with hypo instead of pyro, or attempting to take portraits of the baby indoors in a very small fraction of a second.

The second stage occupies a larger place and involves more worry to the teacher. The pupil is beginning to know a little and has not the same blind faith in the instructions of his mentor. He brings you opinions culled from some book on photography and asks what you think of them, or he asks whether he shall follow certain advice given him by others. It is necessary in the early stages to secure as perfect freedom from other advice as possible, as it may interfere with the order of instruction planned out, and only tend to confusion in the mind of the pupil.

Of course the beginner is only too ready to dabble in various printing processes all at once, but it is advisable to insist in a certain measure of success being gained in one process before proceeding to attempt a new one. As an instance of the glorious state of muddle and confusion into which a beginner can get who is constantly going from one printing or other process to another without stopping to master any, it suffices to mention the case of the genius who used a fixing solution for his platinum prints, consisting of three drops of hydrochloric acid in twenty ounces of water. This was clearly a case of confusion with the acid bath for bromide paper.

Should the pupil happen to be one who delights in makeshifts, this second stage in the teaching will be a hard trial to the instructor.

He will probably use the bathroom of his house as a dark room, and will not bother to put up proper cupboards for his dishes and chemicals. He tacks over the window a sheet of ruby medium and thinks the room is complete. Bye the bye the medium hangs badly and lets light in all around the edges, but in spite of your objections he thinks it safe. The dishes and bottles being all pushed, when done with, into a corner, the dishes are apt to get contaminated and produce various failures otherwise unaccountable. I protest always against the use of the bathroom; it is sure to be wanted to bathe the children, or some one wants to get hot water just when you are engaged in developing a most important exposure, with the result that unpleasantness occurs and remarks are passed which are all the more heated in expression through the fact of there being a locked door between.

Then there is the genius who prefers to manufacture his own apparatus as far as possible. I know one who made a series of dishes, wooden sides with glass set in. They looked very nice when varnished, but it was afterwards found that he had filled up the joints with glue, and as it softened it let out the solutions all over his developing table and spoilt a suit of clothes. After recovering from this mishap he set to work to make a pendulum rocking table from instructions contained in one of the photo

papers. It rocked very well without any weight on it, but stopped dead when a dish was put on it, and another failure was recorded.

During this second stage it is well to act on the motto, "Experentia Docet," and to confine your assistance to as small an amount as possible. It is surprising how soon the pupil will change his state of mind under this treatment, and once more will prefer your judgment to his own on many matters. He will begin to appreciate your advice to master one process at a time. I am always glad to find that the pupil is learning to estimate the merits of varying kinds of negatives correctly, and when he begins to get tired of printing out paper or bromide and yearns to imitate the higher excellencies of your platinotype or carbon prints, it is a sure sign that your labors are over, and what remains to be done is only in the way of occasional advice.

The third stage I have mentioned does not always occur, but has been frequently experienced by most of us. I call it the "Ungrateful." The pupil remarks to a third person that your teaching is not correct, perhaps, that you gave him a formula to use in developing which does not give the best results, or that the paper you desired him to use in printing is not a good one, or he takes exceptions to advice you gave him designedly and with a purpose as appropriate to the knowledge he had then attained. This criticism loses sight of time and place, and makes one seem foolish in the eyes of others.

The experience of the teacher should prove most useful in selecting the apparatus required. The camera will probably be a hand camera, and any one would require all the judgment he can use to decide upon the one necessary. The demand is usually for a camera that will take anything, and do it with as little trouble as possible.

One very difficult class of pupil is the tyro who only wants to make records of his holidays or secure the portraits of his friends. He is probably superior to all considerations of light, exposure, stops and other details, and expects you to supply him with a one solution developer to tackle all variations. He cannot bother to take notes, and usually asks you to develop the first results. In the dark room he hands you a plate or film and

says, "This one, I think, is a landscape, bright sun, one second exposure, if I remember correctly, or *else* it is a portrait of the baby taken indoors, one-tenth of a second exposure." I imagine I can hear the learned ones say, "Well, that is easy enough, you must develop tentatively!" It is a nice word, "tentatively," and sounds well, but it hardly applies to all variations.

This question of the intensity of light is a great puzzle, and I have been asked before now why you cannot take portraits indoors at night with the ordinary gas lights of a sitting room. The beginner is apt to forget that the light gathered in through the lens is so small in quantity, and to compare it with the effect of the same light on bromide paper in printing.

An explanation is frequently sought as to the reasons for failure in development or printing, and when details of the operation are stated the performance appears correct, and if you repeat the operation yourself you get good results. It is as though there were some mysterious agency at work to prevent success and not any fault in the worker. I believe in some cases the beginner really believes this is so.

After all, though the teacher is subject to much worry and blame, there are some compensations in store for him. The fact of having to explain simply and without amplification tends to bring before him the essential facts of each process, and, as it were, he harks back to first principles, to the improvement in his own results. The knowledge, also, that you have made another's path plain, makes up to you for a great deal of the labor you have spent, and even for the vituperation you have occasionally received.—*Journal of the Camera Club.*

How to Get Along.—Do not stop to tell stories during business hours.

Have order, system, regularity, liberality and promptness.

Never buy an article you do not need simply because it is cheap and the man who sells it takes it out in trade.

Strive to avoid hard words and personalities.

Don't kick every stone in the path. More miles can be made in a day by going steadily on than by stopping.

THE SYMPSYCHOGRAPH.

THE LATEST DEVELOPMENT OF THOUGHT PHOTOGRAPHY.

DAVID STARR JORDAN, President of the Stanford University, has just presented himself to the country as a scientific joker. In the current issue of the *Popular Science Monthly* appears a paper on the "Sympsychograph," which his name will cause many sober-minded people to read with growing wonder.

Prof. Jordan seriously describes an experiment of the "Astral Camera Club, of Alcade," proving that a thought will leave an impression on a sensitive plate—in other words, that thoughts may be photographed.

The Astral Camera Club was formed, he explains, to investigate modern problems along the purely scientific lines of photography. It made extensive tests of the Roentgen ray and kept abreast of the latest investigations of the scientists of Europe. "Prof. Rogers," he says, furnished them their latest sensation:

> Prof. Inglis Rogers, of London, found that not only could pictures be produced in darkness by means of invisible force, but that the invisible waves sent out through the ether by the mind could also affect a sensitive plate. Just as one sensitive mind at a distance receives an image sent out from the psychic retina of another, so could the same image be concentrated and fixed upon a photographic plate. Prof. Rogers in a matter-of-fact way looked for a few minutes at a postage stamp, then retired to a dark room and gazed through the lens of the camera at the sensitive plate. The figure of the postage stamp was on his mind, and from his mind it passed out through the sensitive ether to the plate made ready to receive it. The result was a photograph of the stamp—small and a little blurred, but showing the undoubted features of the gracious Queen, and the words "one penny."

The Astral Camera Club then undertook to carry the discovery to its logical conclusion. They undertook to visualize a mere thought and record it upon the sensitive plate.

Seven of the most enthusiastic members undertook to think of a cat in a dark chamber that served for camera and to visualize the imaginary conception. Their success was marked, and the

picture of a misty group of seven cats was the result. This picture is printed in the current issue of the *Popular Science Monthly*.

President Jordan describes the picture as follows:

"As might be expected in a first attempt, there is a lack of co-ordination of the parts. Mr. Gridley, the school-master, had planned his cat on a large scale—a huge cat face, with gray, radiant whiskers, looking directly at the beholder. Most of the others thought of the cat in lateral view or profile. The variant and vagrant individual impressions naturally appeared on the camera before the ether waves were co-ordinated and the reflex influences came back from all to one, regulating and co-ordinating the thought of the cat. Thus these preliminary impressions are recorded as ghost pictures in various places about the plate before the ultimate composite view was achieved. The delay in this regard has darkened the centre picture, interfering a little with its perfection of definition. This darkening would probably appear in other experiments on account of the long exposure (sixteen minutes) thought necessary for a picture of this kind, in which odic magnetism is made to take the place of light."

This is conclusively abstruse, but the closing sentence of the paper gives the credulous reader a sad awakening:

"Meanwhile the cat of Mr. Thompson, the janitor, who alone could answer the question, lay in the darkness under the warm stove and purred softly."

And this is the truth, the only truth in the article. The photograph was made up by Prof. Sanford (one of President Jordan's faculty), of seven composite views of the college janitor's cat, and for the express purpose of assisting in this hoax upon the innocent public. President Jordan is now in Alaska hiding from the consequences of his deed.—*N. Y. World.*

The Value of Hypnotism.—"I can't understand how it is that young Swiftleigh manages to dress so well. Certainly his salary doesn't warrant it."

"Oh, that's easily accounted for. He's a hypnotist."

"But what has hypnotism to do with a man's clothes?"

"Why, every time he wants a new suit he makes his tailor believe that he's going to pay for the old ones."

THE JOLY COLOR PROCESS.

IT is with great pleasure that we publish the following communication. The paper referred to in the August JOURNAL was merely published as a matter of news, such as was going the rounds of the daily press, and was neither endorsed or commented upon by the editor.

NEW YORK, September 8th, 1896.

To the Editor AMERICAN JOURNAL OF PHOTOGRAPHY:

Sir,—I have just seen the article in your August number, entitled, "Photographs in True Tints (?)," on page 360. I hasten to correct some of the statements it contains. The article is condensed from newspaper accounts that appeared here in June last, and one of the statements is that a company had been formed at Richmond, Va., to work the McDonough (1892) patents. I am informed by the Secretary of the Commonwealth of Virginia that no such company has been formed in that State so far as the records of his office show. I am also informed that the records of the two courts in Henrico county, Va., in which all companies organized in Richmond must file their articles of incorporation, show no signs of such a company as that mentioned in your August number. I am thus compelled to conclude that the company is a "fake."

Now, as to the interference between McDonough and Joly: McDonough obtained two patents on March 22d, 1892, for dusting pure red, pure green, and blue colors over a tacky plate, over which he flows the emulsion. He has himself written a letter in which he says that one can get but *one* picture by this process from each plate. Obviously then, there is no duplicating of prints by those patents, even if the processes were founded on true principles.

The interference is between pending applications of the two parties, and of these Joly did *not* find McDonough's ahead of his own; in fact, Joly's application was filed nearly five months ahead of McDonough's. Indeed, McDonough did not file his until thirteen days *after he had read*, in your issue of December, 1894, a complete copy of Joly's British patent, save the claims. The interference is still pending; neither party has yet got a patent on the ruled lines. McDonough has admitted, under cross-examination, the truth of my assertions in this paragraph concerning the reading of Joly's specification in your JOURNAL, and his testimony is corroborated by the man who showed it to

him. Nor does McDonough show a single photograph as an exhibit in the interference that was not made some ten months after he had read that publication by you of Joly's patent in England.

Trusting that you may find space for this, and thanking you in advance for its publication, I am, Yours respectfully,

RICHARD W. BARKLEY.

To Remove Tarnish from Daguerreotypes.—The so-called fading of the daguerreotype image is due to the tarnishing of the silver surface. This is due to the action of atmospheric air and moisture, and can be removed if due care and certain precautions be taken. To do this, first remove the metal plate supporting the picture from its surroundings. At all times be careful only to touch the edges or back of the plate, and do this as little and as gently as possible, and above all things not to touch with any solid bodies whatever—finger, brush, cotton, wood, etc.,—the surface bearing the image. Gently blow away any dust particles. Then, holding the plate by the edges, or by one corner in a pair of pliers, or better still, a small hand vise, flood its surface with a mixture of equal parts of pure alcohol and pure water. (N.B.—Avoid methylated spirit.) Repeat this until all appearance of greasiness is removed. Then a final rinse in pure water. Next pour on its surface a weak solution of potassium cyanide. (N.B.—A deadly poison, to be used with every care.) A convenient strength is about ten grains per ounce. Repeat this again and again with ample patience until the cyanide solution slowly and evenly dissolves away the tarnish. This being done, again rinse the surface in pure water, and drain from one corner. Having shaken off all adhering drops, now bring the plate over the flame of a spirit lamp and warm it gently, beginning at the top, and gradually drying the plate from top to bottom. Unless this be done, drying marks are liable to occur. When thoroughly dry and cool, the plate is returned to its case with every care to see that it is not rubbed, etc., and so packed up that the atmosphere is excluded as much as possible. As the daguerreotype process is practically extinct, all specimens are likely to increase in interest with time.—*London Amateur Photographer.*

When a sick man refuses to send for a doctor that is a sign that he still clings to life.

THE AGE OF THE BICYCLE.

BY J. FOCUS SNAPPSCHOTTE.

IT is generally assumed and taken for granted that the "wheel" or "bike" is strictly an outcome incident to our advanced culture and progressive civilization of the closing decades of the nineteenth century. Further, that in this particular the people of the present decade are far in advance of all former generations. It is mainly upon this account that the new means of propulsion has found especial favor with the advanced and progressive femininity of the present age.

No class of persons has taken more readily to the wheel than the new or strong-minded woman. No matter whether maiden or matron, neither age nor social position have debarred her from asserting her individuality upon the wheel,—some even to the extent of taking their "spin" clad in the much-ridiculed garment known as "bloomers."

Such as indulge in the latter costume generally are of the advanced type who chew gum like a car-driver, wear a Fedora, and pride themselves upon their progression and independence of all public opinion. Then they will tell you that the wheel and bloomers go together, and mean the emancipation of all womankind, and are sure to become the style of the future, and that, even before the vexed question is settled whether the twentieth century begins with the year 1900 or 1901.

Devotees of the bicycle and the new regime point with pride to the gains they are continually making, the latest accession to their ranks being the evangelists of the Salvation Army, many of whom have taken to short skirts, leggings and the wheel. They further venture the opinion that ere the century is out every sensible woman will be "awheel" and in bloomers, and thereby free herself from all domestic drudgery and old fogy notions.

Now, be this as it may, bicycles and bloomers are both considerably older than is usually supposed, They are not an emanation of the present decade, nor by any means an outcome

of modern civilization, but merely a revival of a long-forgotten style of by-gone ages.

Most persons who have paid but little attention to the subject are of the opinion that the modern "safety" is merely an improvement upon the 52-inch racer of a few years ago. Others, again, who have been interested in the evolution of the bicycle and consulted technical works upon the subject have found that the credit of inventing the bicycle or velocipede is due to Blanchard, of Paris, in 1799. From that time down to the present numberless improvements and modifications have been registered at home and abroad, until the advent of the "'96" safety, with pneumatic tire, cushioned frame, hygienic saddle and other improvements has popularized the "wheel" with all sorts and conditions of men and women, with the result mentioned in our introduction.

Of late it has been proposed, we think, in a periodical devoted to cycling, that the centennial of the invention of the bicycle by Blanchard, in 1799, be fittingly celebrated three years hence by meets, exhibitions, tourneys and parades all over the civilized world.

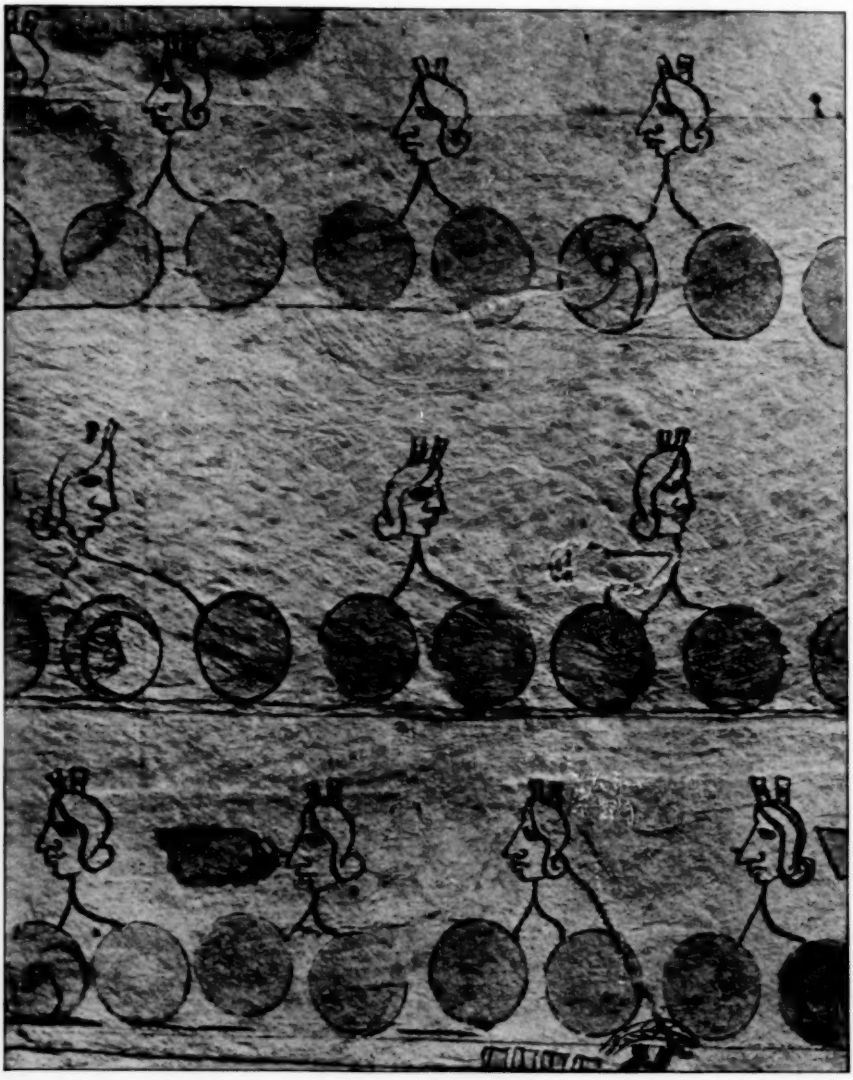
Now, however, comes a new disturbing factor, one which greatly changes the situation as to the age of the bicycle. In view of the newly discovered evidence, it appears that it would be far more appropriate to organize a millennium than a centennial. The facts upon which this suggestion is based are as follows:

The learned and genial glyptophile of the Columbian Psychological Institution, who is also one of the most celebrated entomologists in the world, with eyes so sharp that he can without glasses easily detect the parasitic Xenos upon the ordinary wasp, while examining some of the priceless specimens in the collection of the institution found an ancient manuscript of Aztec origin. It consisted of a roll of several pieces of fabric, a kind of grass cloth, which were covered with hieroglyphics or picture-writing somewhat similar to that of the ancient Egyptians of the early dynasties. This curious record, tradition states, was part of the booty captured by the Spanish soldiers when they looted

one of the sacred temples of ancient Iztapalapan; thence it was handed over to the clergy to decipher and render into Spanish. Traces of the latter work are still to be seen upon the fabric. It is supposed to have been sent to the library at Seville, whence, some time during the last century, presumably during the French occupation, it was either borrowed or stolen, and eventually found its way back to America, and a final resting-place within the archives of the Columbian Psychological Institution.

This document at various times has formed the basis for learned dissertations as to the character of the inscriptions from an ethnological, physical and historical point of view. One roll especially has attracted more than ordinary attention. It contains a series of discs connected in twos by a sort of triangular frame, which in turn is surmounted by a human figure. This has been variously explained, the most generally accepted explanation being that it was some kind of a contribution list, and represented the Aztec taxpayers rolling in their tribute, or taxes, as the case may be, in the shape of some large argentic coin of the period. Another curious feature about the inscription is that every seventh wheel is a red one. This has caused considerable diversity of opinion, some of the savants holding to the opinion that the hieroglyphics had some astrological significance, while others of a more modern turn of mind have declared that the document was a political one, and typified a ratio of 6 to 1, whatever that may have implied at that early day.

It was, however, left to the learned and genial glyptophile of the Institution to solve the mystery of the ancient hieroglyphics of the extinct Aztecs. It took but little effort for the learned scientist to discover that the whole matter recorded some civil ceremony or local event; in fact, it was nothing more nor less than a bicycle parade, in which even the hand camera of that early day was represented, and the Montezuma Ixtlixochitl formed a leading feature. A close examination of the fabric showed traces of the outlines of the costumes worn by the lady wheelers of the period. That it must have been a night parade is also indicated by the fact of some wheelers carrying an apparatus, evidently for illumination or fireworks.

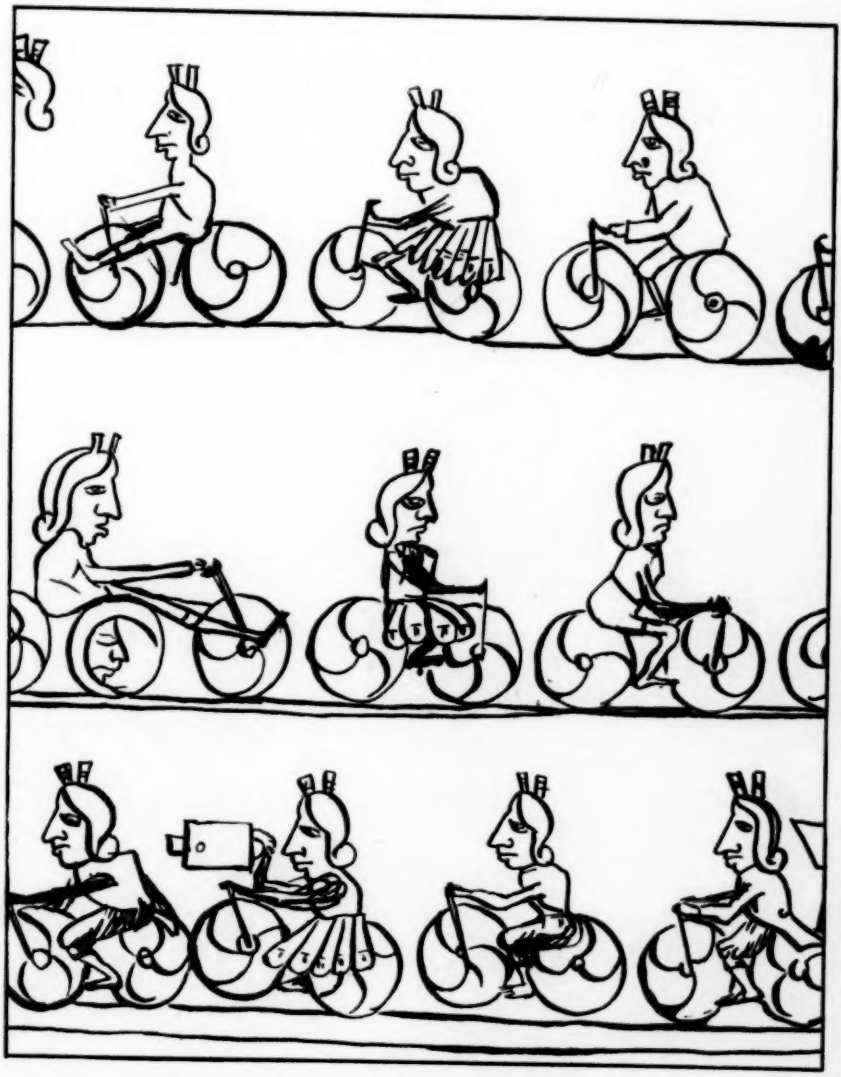


THE AGE OF THE BICYCLE. (PLATE I.)

SECTION OF AZTEC CODEX, USUALLY CALLED THE "TRIBUTE ROLL OF MONTEZUMA."

NEGATIVE BY JULIUS F. SACHSE, FROM ORIGINAL MSS. IN POSSESSION OF THE AMERICAN PHILOSOPHICAL SOCIETY.

(FOR FULL EXPLANATION VIDE TRANSACTIONS VOL. XVII, NEW SERIES PART II, ART. IV.)



THE AGE OF THE BICYCLE. (PLATE II.)

ROENTGEN XXX SCIOGRAPH OF AZTEC PAPYRUS.

RESTORED BY PHOTO-MECHANICAL X RAY EXPERT OF TURKEYTOWN CAMERA CLUB.

A special meeting of the Institution was at once convened, and the discovery brought before the members. A resolution was passed and a committee appointed for thoroughly examining the document, passing upon its antiquity, and if possible restoring it to its original condition.

When the stated evening arrived every seat was filled, and silence reigned within the classic halls as the chairman commenced to make his report. He stated that their first object had been to settle the age of the rolls. To determine this important question, some of the fibre was submitted to several microscopists of the Micro-photographic Society, who subjected the strands to a magnification of over 10,000 diameters, under one of the new Zeiss-Goertz alcoholic immersion lenses, made of the new Jena glass by Professor Glasschneider of Paris, the composition of which was so adjusted as to be entirely free from spherical as well as chemical aberration. Photographs of the magnification were then taken and lantern slides made from them, which in turn were projected upon a screen of ground plate glass. This was done by the aid of a triple electric chromatic arc lantern, the illumination being still further increased by using an automatic ether saturator of the latest pattern.

The result of this investigation was that the age of the fibre was determined to have been at least 621 years old when Cortez obtained a foothold upon Mexican soil.

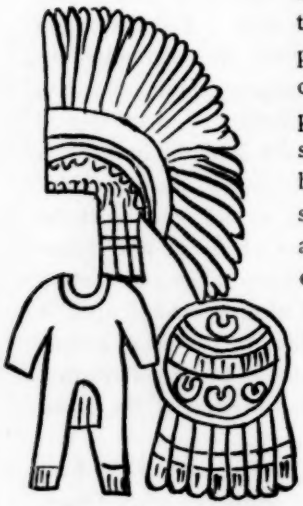
The chairman went on to state that the next aim was to discover, if possible, whether any of the painting now faded upon the surface still remained within the fibre, which was neither visible to the human eye nor came within the scope of the search power of the camera. For this purpose the roll was first subjected to an examination under the newly-invented bi-ocular-poly-fluoro-scope, which was equipped for this purpose with a series of triple transparent mirrors, ruled with a grating of parallel lines of the primary colors, as suggested by the late painting master to the Sultan of Zanzibar.

This test, however, proved a failure, as according to the learned manipulator in charge of the experiment, the ancient Aztecs

evidently worked upon the theory that red, yellow and blue were the true primary colors.

The bi-ocular-poly-fluoro-scope, not answering the purpose, it was determined to try the penetrating powers of the Röntgen X Ray process upon the unique specimen of ancient figure writing.

The roll was then placed between two oaken planks three inches thick, and wrapped in six thicknesses of gum blankets. A piece of ebonite, 24.03 centimeters thick, was then coated with a luminous preparation, prepared by a member of the committee, then an orthochromatized dry plate which had previously been made sensitive to the various color sensations by subjecting it to a bath composed of solutions of naphthol, malachite green and Prussian blue, well protected in a double plate holder, with aluminium dark slides, was placed back of the planks and ebonite, when the whole was submitted to the influence of the X-rays generated in a Crookes tube "made in Germany" of uranium tinted glass. Previous to turning on the current, a ray-filterer was introduced between the tube and specimen. This was made from two pieces of plate glass, the planes of which were determined to be optically true. One of these surfaces was then coated with a film of collodion which had been dyed yellow, of a peculiar shade, determined upon by the professor only after subjecting the ancient roll to a spectroscopic analysis by viewing it through a candelabra prism.



Costume of Male and Female Aztec Cyclers.*

After proper exposure and development, the negative showed the outlines in their pristine vigor as made 997 years ago; it further seemed to show that even the scorcher was not an original product of the nineteenth century. Photographs of both the roll and sciograph were then handed around and compared.

* Photograph from original MSS. Tazoo, Roll 30.

Thus it is shown, thanks to the sharp perception of the learned glyptophile of the Columbian Psychological Institution and modern photography, that the old Aztec roll, which had so long remained a mystery, was now solved, and had proved to be nothing more nor less than a representation of an outing of the Royal Tenochtitlan Cycle Club.

At this point one of the members, known for his archeological research, arose and said that this report and explanation had opened an entirely new field of study; in fact, it had been for him a great revelation, as it now explained the peculiar position used in the burial rites of the ancient Peruvians, as is shown by specimens taken from the tombs in the old cemetery of Ancon, many of which could be seen in the archeological department of the University of Pennsylvania, and had always been a puzzle to the local faculty.

Skeleton of Ancient Aztec or Peruvian Scorcher.
What the present generation may come to.

Now the curvature of the spinal column and the projection of the cranium was accounted for. It was all clear now, and as a matter of fact it was proven that the ancient subjects of the Incas must have been a race of bicyclers, who carried their propensity for the wheel even to the grave.

Thus it will be seen that the age of the bicycle extends far back into the dim ages of the past, and that the favorite fad which is making such sad inroads into the various camera clubs at home and abroad, is by no means an outcome of the so-called advanced civilization of the closing years of the nineteenth century.

The time when the cold water party largely predominated—during the flood.

ON PHOTOGRAPHING OIL PAINTINGS, WITH SPECIAL REFERENCE TO STRAMONIUM AS COLOR-SENSITIZER.

BY JOHN BARTLETT.

WE think it may safely be said that nothing in the whole range of photographic practice presents more difficulties than copying of oil paintings if one has desire to correctly render the color tone values of the originals.

Remembering the expedients had recourse to in the days of wet plate supremacy and the dissatisfaction at the results when compared with a fine engraving from the same subject.

Being compelled to acknowledge the victory of the graver over the sun-beam, pleading the limitations of our art in extenuation, and secretly sighing for some process which might translate more literally the delicacy and depth of relative tone.

Forgetting the exact date, but know it was early in the history of photography that Becquerel showed that chlorophyl made plates from one-fifth to one-tenth as sensitive to red of the spectrum as to the blue or violet.

Then Mr. Tres and Dr. Vogel followed with their important discoveries in orthochromatic photography.

We remember employing these color sensitizers and also the yellow screen, but our results were of a rather flat, tame and unprofitable (especially commercially) nature and abandoned, having to content ourselves and our patrons with smudges of dark for the brilliant reds, yellows and greens of the painting, and pleading that all blues took light and without detail or gradations.

When gelatino-bromide plates attained supremacy we were rejoiced to see that the bromide of silver more correctly translated the adactinic rays than iodized collodion. Though far from the true relations, yet often when the exposures were prolonged and very sensitive plates used behind a yellow glass screen, excellent results followed in particular cases, even without staining the film, and we were presumptious to maintain that the claim to orthochromatic effect was a scientific delusion. But further experi-

ence convinced us of our error. We found that the yellow screen and plenty of time did not always give us the wished for results,—merely a flattening of the blue and violet portion of the painting and a general tameness of the whole.

There is no truth in the assertion sometimes made by superficial observers that the yellow screen alone will produce as good results as the combined action of the screen and sensitizer.

Now if it is at all necessary to preserve in the copy the correct values of the painting to give an idea of its artistic qualities, orthochromatic and orthochromatic plates only can be used till we find some other method.

We have been shown prints from negatives of oil paintings declared to have been made on ordinary brom-silver-gelatine plates, with no other expedient than the interposition of color screens.

Possibly and probably they may deceive those for whom they are intended, who look only at the final results and care nothing for the means, but it does not require much photographic experience or even the best of eyes to detect the work of the retoucher, an elaborate work which must have taken hours to do and have cost considerable money to effect upon the negative in approximating to the color-tone values of the original. The fine stipple of the pencil could be detected with very slight magnification.

We have seen two to three dollars' worth of retouching made upon a 4 x 5 negative. We think photography can claim but little share in the successful result; at least the solitaire color screen can demand small thanks for the contribution.

It is hardly just to seek to nullify the triumph obtained by patient investigation, by assertions of having no truth, and to seek to substantiate the declaration by falsifying results.

All honor to those who have labored in orthochromatic photography, and all gratitude for the generous publication of the results.

Orthochromatic photography is an acknowledged fact, although not yet attained to perfection.

The majority of failures can be traced to careless or imperfect

manipulation and from the employment of plates not freshly prepared.

To be successful orthochromatically, make your own plates just as you need them, handle them with the greatest care, in almost total darkness, and develop them under cover in the most subdued light, only occasionally looking at them to note the progress of development.

I have employed the orthochromatic plate especially for copying oil portraits, and for that purpose have found the following method most successful:

Select a brand of plates of a high degree of sensitiveness and of a thickly coated emulsion. After thoroughly dusting the film place it on a bath composed as follows:

Strong ammonia, - - - - - -	1 dr.
Water, - - - - - - -	14 ozs.

Let it lie about a minute. The object of the immersion is both to soften the film, and also to render it more sensitive.

This operation must be done with the least ruby light possible.

After the plate has been uniformly moistened, remove it and drain the edges on bibulous paper. It is now ready for the color sensitizer which is made as follows:

Alcholic tincture of thorn apple, - -	1 dr.
Water, - - - - - - -	10 ozs.

Thorn apple is the ordinary Jamestown or Jimson weed which grows so plentifully on waste places, the datura stramonium of the botanist.

I make use of the green burrs or seed vessels, macerating two in an ounce of strong alcohol over night, and employ one dram to the 10 or 12 ounces of water. The plate is allowed to remain in this a minute or two, covered and rocked in two directions to insure even absorption. The plate is then drained on blotting paper and dried in absolute darkness.

I have found the stramonium solution superior to others in the rendering of the reds and yellows, and the blues, purples and violets are rendered with much more detail.

Vermilion, Venetian red, cinnabar, Indian red, light red, car-

mine, rose pink, maroon, scarlet, cherry, garnet, crimson madder, pink and light blue are given with about the same intensity. Yellow, lemon, gamboge, cadmium, ochre, Naples yellow, orange, orange having about the same intensity as cobalt blue, violet and dark purple like light red. But the greens, both dark and light, are unaffected and no better than ordinary plates. Hence the process is of no value in copying landscapes where the green predominates, but for portraiture it is admirable, rendering the flesh tints excellently and the yellow and red or blue draperies.

I make use of a deep yellow screen placed behind the lens. The exposure is about ten to twenty times as long as for the normal plate.

Any of the ordinary developers can be used. I prefer the following alkaline pyro :

A.

Sulphite soda,	10 ozs.
Salsoda,	5 ozs.
Water,	60 ozs.

B.

Pyro,	1 oz.
Sulphite soda,	1 dr.
Sulphuric acid,	15 drops.
Water,	6 ozs.

For development, 1 dr. B to 1 oz. of A, and 4 to 6 ozs. water.

The yellow screen is made by adding alcoholic solution o primrose yellow to plain collodion. The glass must be plate glass to avoid distortion.

The process can be advantageously employed in copying old engravings which age has yellowed, and which present so much difficulty with ordinary plates.

I have not tried the stramonium sensitizer with the yellow light of petroleum without the screen. If the light of coal oil can be employed the time of exposure can be greatly reduced.

Of course there are devices for lighting the subject most advantageously, but the practical worker is well acquainted with them, as they are easily accessible to the amateur.

PHOTOGRAPHY IN NATURAL COLORS.*

(Continued from page 418.)

If the color of the incident rays does not agree with a fundamental pigment color, *e.g.*, green rays, those colored products will be least decomposed which best reflect green. These are yellow and blue, and, after a time, a green mixture will be produced, with a little white.

White light will decompose all the colored products that are first formed, and in the end only white will remain.

In the absence of light the color-receptive substance will remain black.

A point that at once arises in this connection is, why should the compounds that are formed have the same color as the incident rays, and why, when they have acquired this color, should they undergo no further change? What advantages, for example, has a red-colored substance over substances of other colors in respect of its unalterability by red rays? The answer is, of course, that a red substance reflects red rays, and does not absorb them, and therefore is not affected by them. On the other hand, a red substance absorbs rays of other colors, and may be affected by them if exposed to them subsequently. A similar explanation holds good for any other colors.

So far, we have assumed that we were dealing with a perfect color-receptive substance, but, even in this case, the intensity of illumination and the duration of exposure must not vary within very wide limits, or the reproduction of the colors will not be accurate. With too intense illumination, or too prolonged exposure, white will begin to preponderate, and the various colors will fade.

It is, however, conceivable that a sensitive substance may be only partially color-receptive, and in that case, of course, colors will be only incompletely produced. If the substance is not black, it will not reproduce black; if it is not sensitive in proportion to the absorption, it will remain more or less unaltered by one or more of the groups of rays which it absorbs, and, there-

fore, cannot reproduce the color or colors corresponding to them. If the fundamental pigment-colors are not monochromatic, they will reproduce the monochromatic illumination which they reflect, either altogether incompletely or with hues which are incorrect. A similar error will also occur if the first decomposition products are not sensitive in proportion to their absorption.

If the decomposition products show fewer than three different colors, or if the three colors are not sufficiently different from one another, all colors cannot be reproduced. Similarly, if no white decomposition product is formed. white cannot be reproduced.

In spite of all deviations, or shortcomings, each sensitive colored substance which yields colored products of photochemical decomposition will be able to reproduce colors to a certain extent. Incident rays will leave the correspondingly colored compound undestroyed, since it will reflect them, but they will decompose substances of other colors the more readily the more they are absorbed by them.

It would seem that the properties of color-receptive compounds must be very complex, and the compounds themselves very difficult to obtain. As a matter of fact this complexity is necessitated by the nature of all the known processes. In reality, however, there is no conclusive evidence that this complexity is indispensable, and it will appear subsequently that there are grounds for believing that the end can be attained by simpler processes than those at present known.

AGREEMENT BETWEEN THE THEORY AND THE FACTS.—In order to ascertain how far the theoretical basis that has been laid down is trustworthy, and can safely be adopted as the starting point of further investigation, it is necessary to apply it to the processes of color photography already known, and to find out by careful comparison of the theory with the actual results of experiment, how far the former coincides with the latter.

It is obvious, in the first place, that the substances hitherto employed do not satisfy the definition already given of perfect

color-sensitive substances, because they do not, as a matter of fact, completely reproduce colors.

The first deviation from the theory that attracts attention is that the sensitive substance is not black; in Seebeck's process it is gray violet to dark violet, and Poitevin's process it is gray brown to dark gray violet. According to the theory, black cannot be reproduced, and in practice it is found that black is not reproduced, but its place is taken by the dark hues specified. It is noteworthy, however, that some of these substances have, in common with black, the property of absorbing all visible rays to a certain extent, and are also more or less sensitive to all of them.

The decomposition products are substances of different colors, and, according to the statements of Carey Lea and of Krone, they would seem to be sufficient in number, and to show sufficient color-differences amongst themselves. They are not, however, completely monochromatic, and this is one reason for the partially incorrect reproduction of the various colors. Again, the facts agree with the theory.

Seebeck's process does not yield a white decomposition product under any conditions of exposure. According to the theory, Seebeck's process cannot reproduce white, and, as a matter of fact, it does not. Both as regards the monochromatic character of the colors of the decomposition products, and the formation of a white decomposition product, Poitevin's process has the advantage over Seebeck's. The tendency of the white substance to form is smaller than that of the other products, and it is only after prolonged exposure that the colors become paler.

The only property of color-receptive substances that remains to be inquired into is the relation between the sensitiveness and the absorption co-efficient. If the theory is correct, the deviation from strict proportionality must correspond with the deviation from accurate color production.

In Seebeck's process, red is the most distinct of the colors, and it originates under red illumination. All the other decomposition products, whatever their color, must be sensitive to red

rays, and be gradually converted into the red substance by exposure to them. This is what actually occurs.

The method of experiment adopted by Wiener in this case, and in other similar cases, is very ingenious. A colored image of the spectrum is first produced in the usual way, and is then turned through an angle of ninety degrees, and again exposed to the spectrum. Under these conditions, each colored band formed during the first exposure is exposed to the whole spectrum during the second exposure, and thus the behavior of the first decomposition products under the action of different rays can be observed, and their changes noted.

When one of Seebeck's plates is treated in this way, it is found that during the second exposure the red rays destroy all the colors formed by the first exposure, with the exception of red, and all the colors resulting from the first exposure, up to the beginning of the ultra-violet, are changed to red by the action of the red rays during the second exposure. Similar phenomena are observed in the case of the other colors, but since even under the best conditions the colors of the first exposure are not very distinct, the precise effects of the second exposure are not easy to observe. Wiener is able to state, however, that the red of the first exposure is destroyed by the green and blue rays during the second exposure, although at the same time a brightening up of the ground tones associated with red can be observed. Further, the green of the first image is destroyed by the red and by the blue of the second exposure ; and the red and the green of the first are destroyed by the blue of the second, the violet of the first being also altered. Since yellow is scarcely visible with Seebeck's process, the production of blue by the blue rays is explained ; they destroy all the decomposition products that have a color other than blue. As a matter of fact, after red, blue is the color that is most satisfactorily reproduced.

Poitevin's process gives a better reproduction of all the colors, and hence the experiment with the crossed spectra is more easily carried out. In one of Wiener's experiments, the first and second exposures each lasted half an hour. The colors of the first image remained unaltered under the corresponding rays

during the second exposure, but were changed by most of the other rays in the following way:

Red of the first image became yellow in the yellow rays of the second exposure, but was not altered by the other rays.

Yellow of the first image during the second exposure was unaltered by the red rays, and was not much affected by the green, but became greenish-blue in the blue rays, and was destroyed by the violet.

Green of the first image became red in the red rays, yellow in the yellow, and was altered by the blue and violet.

Blue of the first image became red in the red rays, yellow in the yellow, green in the green, and was changed and became darker in the violet.

Black violet produced by the violet rays in the first exposure becomes red in the red rays, and, in the other rays tends to be changed into the corresponding colors, though the results are somewhat indistinct.

Generally speaking, each colored decomposition product is only produced by the action of incident rays of that color, and is altered or destroyed by rays of any other color.

An exception to this rule is the yellow product, or, to be more accurate, the orange product, since the substance produced by the yellow rays is orange in hue rather than pure yellow. It is not altered by the red or the green rays during the second exposure, and is not easily decomposed by the blue rays, since under their influence it is changed, not into blue, but into the mixed color green. These results might, at first sight, seem to be antagonistic to the theory, but closer examination shows that the discrepancy is due to defects in the method, or, in other words, to the fact that the sensitive substance is not a perfect color-receptive substance. According to the theory, for example, if the orange substance is not sensitive to red or green in proportion to its absorption of those rays, it may be formed simultaneously with the red substance under the influence of the red rays, and simultaneously with the green substance under the influence of the green rays, without being subsequently destroyed in either case by prolongation of the exposure. Moreover, if it

is more resistant in general than the red and green products, it may in the end gain the upper hand, as it were. This, in fact, is what happens. The original narrow orange-yellow band broadens out on both sides as the exposure is continued. In some cases the extension is greater towards the red than towards the blue end of the spectrum, but in other cases this difference is not observed, and the irregularity would seem to depend on small differences in the mode of preparation of the sensitive film.

Careful experiments showed that with short exposures the decomposition-product formed by rays of the color of the sodium line D is not yellow but red, and as the exposure is continued it acquires the orange-yellow color. It would seem, therefore, that the yellow substance results from the decomposition of the red substance. Now, since the red substance is produced more easily by red rays than by green rays, it follows that the red material out of which the orange-yellow is to be formed by long exposure is found in greater quantity at the red end of the spectrum than towards the blue.

It will be seen that on the whole the phenomena observed with Poitevin's process agree with those required by the theory, and where differences do occur, either with Poitevin's or Seebeck's process, they are due to the fact that the sensitive material does not satisfy all the conditions laid down as essential in a perfect color-receptive substance.

Direct photography in natural colors by means of pigment-colors produced by the action of light, as in the Seebeck and Poitevin's processes, is in some respects analogous to the indirect reproduction of colors by photo-mechanical printing, as in the process worked out by Vogel (*Weidemann's Annalen* 1892, xivi., 521). In both cases, the colors of nature are reproduced by means of pigments, and both processes necessitate the employment of substances sensitive in proportion to their absorption. The compounds used as sensitisers in orthochromatic photography may be regarded as belonging to this class, and an advance in our knowledge of such compounds, or the discovery of new ones, may, under certain circumstances, be advantageous,

not only to orthochromatic methods, but also to the processes for direct photographic reproduction of colors.

Further, the methods of color photography by means of pigment-colors, lend themselves more or less readily to purposes of reproduction, since the colors are visible by transmitted light. It is obvious that it would be necessary to employ transparent plates, such as those used by Veress. The photo-mechanical color process has an immense advantage as regards facility of reproduction and multiplication, but the direct process with pigment-colors is, at any rate, superior in this respect to the interference processes.

The pigment-color and the interference-color direct processes are analogous only in that in both cases the colors originate directly under the influence of rays which would produce the same color sensations if they impinged on the human eye instead of on the sensitive surface. It may fairly be said that the ideal of color-process is a pigment-color process, but it is almost unnecessary to say that in practice we are at present very far from this ideal. Wiener hopes that now that the fundamental principles on which a pigment-color process must be based have been worked out, more rapid progress will be made.

It is a reasonable supposition that some help in working out a photographic color process might be obtained from an examination of some of the many known cases of color changes in animate objects. Many of these come under the head of what is known as "protective coloring," and the process by which the color of the living object changes until it becomes similar to, or identical with, the color of its surroundiugs, Wiener calls "color adaptation." Although certain pupæ acquire with great rapidity the color of their surroundings, and many other similar cases are on record, it would seem at present to be impossible to consider the phenomena of color adaptation apart from the physiological processes of the living organism. In other words, it would not be justifiable to assume that the color changes that take place in the living organism under the influence of its external conditions are identical with the color changes produced on Seebeck or

Poitevin films, either in the nature of the final products, or in the mechanism by which the changes are brought about.

PROCESSES OF THE FUTURE.—Wiener believes that the ideal color-receptive substance, or, in other words, the material for the sensitive film of the perfect color-photography of the future, is to be looked for in a black mixture of three substances of different colors, these substances being sensitive to light in proportion to their absorption, and being converted into white compounds by the decomposing action of light. It is obvious that almost endless variations of such a process are conceivable. It is also possible to imagine many different ways in which the fixing of the colored images may be accomplished.

It is not impossible that the colors produced by the action of light, and still susceptible to change on further exposure, may by suitable chemical reactions be converted into other substances which have the same colors, but which are not sensitive to the action of light. It is also conceivable that the colors may be protected from the action of light, or rendered insensitive, by the addition of some suitable substance, and it is interesting to recall the fact that Otto Witt found it possible, by impregnating the fabric with certain metallic salts, to make some fugitive colors relatively stable under the action of light. Further, just as in some of the old negative processes the addition of a sensitiser to the film was indispensable, it is conceivable that the color-reproducing film may be made sensitive by the addition of some suitable compound, and may lose all its sensitiveness when the compound is washed out after the exposure has been made.

No one will deny that further investigations are greatly needed, and it is desirable that the problem should be attacked in as many different ways as possible, for experience shows that as a rule no one solution of a technical problem satisfies all requirements. When several solutions are available, each of them is used for those ends, and under those circumstances, for which it is best adapted.

THE CARBON PROCESS.

This beautiful process has of late received renewed attention from some of the leading professional photographers in the large cities, some of the portraits exhibited being equal to any foreign specimens. In the hope of interesting still others in the beautiful permanent process we republish the following simple directions for manufacturing the tissue.

Instructions for Carbon Work.—Carbon tissue is sold in rolls or bands. Bands are made twelve feet long by twenty and thirty inches wide, and before sensitizing may be cut to any size desired. Transfer paper, flexible support, and wax solution are also required.

Carbon tissue is produced in various colors, which should be designated when ordering. Warm black, purple, chocolate brown, portrait brown, sepia, red chalk, rouge, blue and green. For line work, views, etc., warm black is recommended. For portraits, warm black, brown, sepia, and other colors can be used with pleasing effect.

Carbon prints are produced either by single or double transfer. "Single" when a reversed negative can be obtained; "double" when printed by contact from ordinary negatives, in either case using the same tissue.

To sensitize the carbon tissue, cut to size and immerse from eight to ten minutes in the following solution: Water thirty ounces, bi-chromate of potash one ounce.

This bath should be kept at a temperature of from forty to fifty deg. Fahr., and tissue sensitized in dark room or by shaded gas light.

After removal draw each side of tissue over a glass rod to insure evenness and avoid streaks. To do this a couple of snips, fastened to stick of convenient length, should be applied to one edge of tissue, holding same in one hand with glass rod in the other, drawing tissue carefully over same, or squegee off upon a clean glass plate, face of tissue in contact with plate; this is recommended in hot weather, as tissue will keep longer. Hang in a well ventilated *dark room* to dry, where it will be free from dust and any gas or noxious fumes, and will dry in from two to three hours. It is well to sensitize tissue for each day, the night previous. If put in a tightly covered tin box the sensitized tissue will keep several days. Negatives for carbon printing require a mask of black paper called a "safe edge," to protect the edge of tissue not covered by the negative itself from the light. It is about three times as sensitive as silvered paper, therefore requires only one-third as long exposure in printing.

As a guide in printing a single tint actinometer is used, experience with which soon enables one to judge how many tints a negative will require.

For Single Transfer.—After sensitizing as directed, place paper on your reversed negative, in an ordinary printing frame, and put out to print, together with the actinometer, by which alone time of exposure must be judged. To develop, first immerse the print in cold water, and bring in contact with same a piece of *transfer paper* (which should be cut somewhat larger than the finished print), after which remove to a glass or other flat, smooth surface, and bring in more perfect contact with a soft rubber squegee. First protect the tissue by spreading a wet rubber cloth over same, upon which to apply the squegee. Let dry five or ten minutes, then develop in clean water 90 to 100 degrees, increasing the temperature if necessary, to make the paper pull off readily. Wash away all soluble color, rinse with cold water, then in a 10 to 20 per cent. solution of alum, again in clear cold water, and put to dry in a cool place free from dust.

In making single transfer prints from negatives, prints will be reversed unless a reverse negative is used.

For Double Transfer.—To prepare the flexible support, fold up a small pad of fine cloth and wet it with the waxing solution, rub this over the flexible support and allow it to dry; again repeat this operation, so as to make sure that the surface is perfectly coated after drying. Immediately before the print is put on, with another dry pad, rub off all the surplus wax, leaving an evenly coated surface.

Proceed precisely as directed for single transfer, only using a flexible support instead of transfer paper, from which, after print is dry, it can be re-transferred at any time to the final support. With proper care the flexible support can be used over again almost indefinitely.

When ready for the final transfer immerse in cold water, together with the "final support" or transfer paper, and as soon as soft and pliable (usually from three to five minutes) bring together, remove and squegee in perfect contact as before and hang away to dry.

For carbon transparencies a special tissue is used. This tissue is sensitized in the usual way, but the exposure is about double that required for carbon prints. Place tissue on negative and print as before, making allowance for additional time required. Take a cleaned glass, coat same with substratum, a solution made up of three grains gelatine to ten ounces of water, adding one drachm of a ten per cent. solution of chrome alum, mixed warm. Flow on plate and allow to dry, then immerse the print together with the prepared plate in cold

water, bring them together in contact and squegee of as in single transfer. Place between soft blotters about ten or fifteen minutes, and then develop. Care should be taken to place all carbon prints to dry where they will be free from dust. With the transparencies for enlargements this is of great importance, as all defects are magnified in the negative.

To enlarge, place transparency in camera, film side to the lens (making a reversed negative) for carbon printing, or the glass side to lens if for silver print. Negatives for carbon should be rather more vigorous than for silver printing.

NOTE.—The curl in the tissue caused by rolling up in the box may be removed by putting it in a damp place. A large box containing a wet cloth (not in contact with tissue) will answer.

Cycling: Its Use and Abuse.—Those who believe in the necessity of physical exercise, and we belong their number, have need also to remember that even so good a thing as this is in excess an evil. The use of the cycle is a form of bodily recreation in itself doubtless wholesome; none the less is it open to the mischievous effects of undue indulgence. Tempted by the ease of movement, combined as a rule with attractive scenery, every one tries it. Every one too finds he can do something with it, and considerations of weather, constitution, age, and health are apt to be dismissed with summary imprudence. One fruitful source of injury is competition. In this matter not even the strongest rider can afford to ignore his limit of endurance. The record breaker, who sinks exhausted at his journey's end, has gone a point beyond this. The septuagenarian who tries to rival his juniors by doing and repeating his twenty or thirty miles, perhaps against time, is even less wise. Lady cyclists, too, may bear in mind that their sex is somewhat the weaker. So likewise the power of endurance varies greatly, and it is better for some to admit this and be moderate than to labor after the achievements of far more muscular neighbors. In short, whenever prostration beyond mere transient fatigue follows the exercise, or when digestion suffers and weight is markedly lessened, and a pasttime which ought to exhilarate becomes an anxious labor, we may be sure that it is being overdone. He that would reap its best results must content himself with much less than this; but unless he can observe such moderation, he had better abstain from it altogether.—*The Lancet, London.*

The Editorial Dropshutter.

The Keeping Qualities of American Dry Plates.—This question, a vital one to many photographers, has been frequently ventilated pro and con in the various photographic periodicals at home and abroad, the usual opinion being that the average dry plate remains sensitive to light but a comparatively short period, after which time the plate becomes useless for photographic purposes. So well is this shortcoming recognized by makers that in some cases time limits are placed upon the boxes, with the caution that the enclosed plates must be used prior to a certain date. Personal experience on more than one occasion made us skeptical of stale plates. During the past month, however, a contrary experience has fallen to our lot. Being called upon to photograph an old Aztec MSS. of the American Philosophical Society, the only plates available were a few Carbutt B plates, 6½x8½, which had been on our dark room shelf for over five years. The plates were hurriedly put in the holders and the exposures made and developed. The result—every plate perfect, with the exception of a slight fog along the edges (randschleir), extending in about one-fourth inch, which in no manner affected the result. Subsequent investigation showed that this special box of plates had been purchased in the spring of 1891. A print from one of the above negatives is reproduced in this journal.

In Memoriam.—We regret to announce the death of our friend and correspondent, Dr. Johann Paul Eduard Liesegang, at Dusseldorf, Germany, after a lingering illness, in the 59th year of his age.

Dr. Liesegang, the publisher of the *Photographisches Archiv*, was well known to every photographic student and expert throughout the world. Wherever photographic literature penetrated, there were the experiments and deductions of Dr. Liesgang known. The readers of the AMERICAN JOURNAL OF PHOTOGRAPHY will easily recall many of his contributions to photo-chemical science and practical manipulations, translations of which appeared in the JOURNAL.

The photographic field at large, by the death of Dr. Liesgang, loses one of the clearest-headed investigators of the present decade, while those who knew him personally mourn a true friend. Little did the writer think, when he last enjoyed a chat and compared notes with Dr. Leisegang, but a few months ago, in the latter's cosy salon in the

Cavallerie Strasse in the outskirts of Dusseldorf, that it would so soon fall to his task to write the obituary notice of the renowned photo-chemist, Dr. Johann Paul Eduard Liesegang.

Johann Paul Eduard Liesegang was born June 26, 1838, at Elberfeld, and entered the local Gymnasium in the year 1843. He afterwards devoted himself to the natural sciences, especially chemistry, at the Universities of Berlin, Giessen and Jena; at the latter the doctorate was conferred upon him in 1859.

At the age of 14 the lad showed so great a predilection for photography that a studio was built for him in the garden of his parents. The result was that two years later, at the age of 16, young Liesegang published a Manual of Photography, which eventually became the great text-book.

After his return from the university, he founded at Elberfeld an albumen-paper manufactory and factory for photographic apparatus. This was removed to Dusseldorf in 1873. The paper works were afterwards enlarged and supplanted by his new chloro-silver-gelatine papers (aristo papers), of which he was the inventor. He also introduced the chloro-collodion process into the continent, and introduced it into the trade.

Dr. Leisegang's business enterprise was only equaled by his literary activity. In the year 1860 he established the *Photographische Archiv*, followed by the French *Moniteur de la Photographie*, in which he was associated with Ernest Lacan. His *Amateur Photograph* appeared June, 1887. His quarterly *Laterna Magica*. In addition to the above Dr. Leisegang for several years published an Italian edition of the *Archiv*, *L'Archivio Fotografico.*

A Specimen Letter from the file of a leading photo-stock house:

L———, S. C., Sept. 15, 1896.

GENTLEMEN—Your catalogue of photographic apparatus was received some time ago, and greatly interested me; but before purchasing anything I wish to make a few inquiries, in order to determine which or what I can start with to the most advantage. I know nothing of photography whatever, and will have to start right at the stump. Therefore I shall have to ask you to explain some things that I don't understand. First, can I start with your instruction-book and apparatus and make a good picture without the aid of a photographer? In using the pocket kodak with films do you have to expose the whole roll of twelve at the same object, or can you expose each on separate objects, if you choose? And do you have to expose the whole twelve

before you can take out and finish a few; and can you print any quantity from the films after developing, as from glass negatives, or do you have to finish them for pictures without printing, same as tintypes? What price do you charge to enlarge one dozen pictures to cabinet size and finish them? I understand glass dry plates can be used on them. Can you load and re-load them in daylight without the use of a dark room?

Please answer the above inquiries definitely, and give me combination price of kodak, developing outfit, two rolls films, twenty-four exposures, one dozen dry plates and plate-holder, four dozen sensitized albumen paper for printing, with a few sample photos made by the kodak, and I have no doubt I shall order a kodak to begin with. I should be pleased to order one of your large outfits, but am not prepared just now to invest that much. Hope to soon make enough out of the kodak if I should get it to pay for a high-priced outfit. Please let me hear from you at once, as I wish to order immediately if satisfactory. Very truly yours, S. J. S.

A New Paper.—Andrew J. Lloyd & Co., the agents of the Thornton-Pickard Co., are exploiting a new paper called *Rayon.* Reports and orders from samples indicate that the new paper may establish itself in the studios of New England and elsewhere.

Artistic Photography.—Mrs. L. Condon, upon her trip to the late National Photographic Convention, visited a number of friends, en route, at Washington city and Philadelphia. It will be of great interest to Mrs. Condon's many friends to know that she received a medal at the convention for the beauty, elegant finish and perfection of her work. She says she feels so much rejuvenated by her delightful trip she will in the future do all her own operating.

She has some new styles of raised work in photography and half tones that have never been seen before in Atlanta.

On her return she visited Niagara, coming directly to Atlanta from the Falls. She reports a splendid trip, and speaks gloriously of the many courtesies she received while gone.

The Tesla Transformers.—While the early and beautiful work of Professor Roentgen and his German collaborators was performed with very simple apparatus, namely, the induction-coil, nevertheless, as interest in his discovery increased, additional means for exciting Crookes tubes were brought to public notice. Among these the one of most importance was the use of the Tesla high-potential, high-frequency

currents. Mr. Tesla has himself demonstrated how by these means an X-ray of extraordinary power may be introduced, even to the extent of affecting a photographic plate at a distance of forty feet. These effects were produced by apparatus on a large scale, but modifications have been made which permit the amateur to avail himself of a Tesla outfit.

Essential to the outfit is the Tesla transformer. This, in brief, consists of an induction-coil having but a few widely separated or well insulated turns of primary wire and a comparatively few turns of highly insulated secondary wire. The ratio of secondary turns to primary turns may be 24 to 1, and the insulation used is generally oil.

The distinctive peculiarity of the Tesla coil is the fact that its heavy primary serves, as a pathway for the successive discharges of the Leyden jars, governed by a spark gap. The discharges are oscillatory in nature and the current is therefore alternating and of high frequency of alternation—much higher than is possible to obtain from any construction of dynamo machine.

To use the Tesla transformer with a static machine, it is only necessary to connect its primary to the external armatures of Leyden jars. The jars used in this case may be of the largest size, as there is by this arrangement no danger of breaking the Crookes tube. In this case, also, a long spark-gay and a powerful spark may be used. Indeed with a proper Tesla coil this method should be an excellent means for exciting the Crookes tube for the production of the X-ray.

Goertz-Anscheutz.—A handsome booklet has been issued containing a description of the new Goertz-Anscheutz pocket camera. It is fully illustrated with reproductions of specimens taken with this compact instrument, as equipped with the Goertz-lens. The German name for this new hand camera is, moment-klapp-apparates.

Why Business Men Fail.—Some time ago a contemporary devoted to the metal trade published a series of letters suggesting the usual causes of failure in business, with the remedies. The following list is compiled from these letters, and embodies the whole subject in a nutshell :—

Purchasing too large quantities of goods on limited capital.
Extending large lines of credit on long time.
Lack of good judgment in assorting the purchases.
Competing on prices below a safe margin of profit.
Want of sufficient capital to sustain the business.
A disregard for the interests of the public.

Spending too much money for personal expenses.
Not sufficient nerve to cope with the difficulties.
A lack of business sagacity or commercial tact.
Depreciation of values due to goods being carried long in stock.
A mistake in the location and class of trade.
Undue anxiety to transact a large business for "love."
Dependence upon one class of customers for support.
Remedies.—Strict attention to collecting accounts due.
A close inspection of the relations of expenses to profits.
A frequent turn-over of the entire stock.
Exercise of great caution to extending credit.
Balancing business ambition with old-fashioned prudence.
Conscientious treatment of customers; practical honesty.
Economy in business and personal expenses.
A systematic avoidance of speculation of all descriptions.
Appreciation of the primary laws which govern business.
Proper self-confidence and stamina of disposition.

The strictly cash business may be imposible in the metal trade, and that may be the reason why no reference to the cash system appears in the above list. Revised for the photographer especially, this list would not be complete without a statement to the effect that one of the best remedies for at least five out of ten failures would be the change from the credit to the cash basis. More failures are caused by uncollectible bills, even when care has been taken in extending credit, than by any other cause in the world. A system which dispenses with the credit system accordingly would only meet the difficulty.

The Joly Process.—E. Normandin, Ingénieur-Constructeur, E. C. P., Paris, 9 Rue Soufflot, announces that he has secured the exclusive concession for the Joly color process in France, and is now prepared to furnish ruled screens and the necessary apparatus required.

Editors have to put up with all sorts of insults. Not long ago, at a society gathering, a lady said to a young man who is connected with a local paper:

"You ought to belong to a church choir."

"But I can't sing. What put the idea of my belonging to a church choir into your head?"

"Oh, nothing, except that I was reading the other day that a New York church proposes to introduce harp music into the choir, and there is not much difference, you know, between a harp and a lyre, so I thought I'd just make the suggestion."—*Texas Siftings.*

PHOTOGRAPHERS' ASSOCIATION OF PENNSYLVANIA.

THE Executive Board of the Photographers' Association of Pennsylvania, at their meeting held at the Commonwealth Hotel, Harrisburg, Pa., September 2, 1896, adopted the following prize list for the First Annual Convention, which will be held in Russ Hall, Harrisburg, Pa., Jan. 26, 27 and 28, 1897.

GRAND PRIZE, 24 pictures only.—Six must be 16 inches or larger, six must be 13 inches or larger, 6 Paris panels, 6 cabinets.

The prize is a beautiful bronze figure, donated by Hugh Morrison & Son, of Pittsburg, Pa. Sprague & Hathaway will give to the winner of this prize a 25 x 30 sepia or water color, suitably framed.

CLASS A. 8 pictures only, 13 inches or larger.—1st, gold medal; 2d, silver medal 3d, bronze medal.

CLASS B. 16 pictures only, cabinets to 13 inches.—1st, silver medal; 2d, bronze.

CLASS C. 12 pictures only, cabinets or larger.—1st, silver medal; 2d, 8 x 15 background, donated by The Hetherington Studio.

Competitors in class C must be from towns of 10,000 or under.

CLASS D. 12 pictures only, cabinets or larger.—1st, silver medal; 2d, 8 x 15 background, donated by Packard Bros.

Competitors in class D must be from towns of 5,000 or under.

CLASS E. 24 pictures, cabinets or larger.—1st, bronze medal and ten gross Aristo Platino paper; 2d, 15 gross Aristo Platino paper; 3d, 5 gross Aristo Platino paper.

Pictures in this class must be from regular ordered negatives. (See rule on class E.)

CLASS F. 8 pictures, exteriors or interiors, 7 inches or larger.—1st, silver medal; 2d, Wilson's Encyclopædia; 3d, one year's subscription to the *St. Louis and Canadian Photographer*.

CLASS G. 12 pictures, any size, of animals or birds.—1st, bronze medal; 2d, Bausch & Lomb shutter, size 5 x 8.

SPECIAL PRIZE, NO. I. 4 pictures or more, cabinets or larger. For best display made with Luxo Flash Powder, W. P. Buchanan will give a 6½ x 8½ R. R. Lens, the winning exhibit to become his property.

SPECIAL PRIZE, NO. II. 4 pictures or more, cabinets or larger. For the best display made with Blitz Pulver Powder, Thos. H. McCollin & Co. will give one of McCollin's Professional Flash Lamps, the winning exhibit to become their property.

In addition to the different prizes all exhibits receiving twenty points or over out of a possible thirty will receive a diploma, excepting those receiving medals or the grand prize or exhibitors in special classes.

RULES AND REGULATIONS.

Competitors for the grand prize or class A cannot compete in any other portrait class, excepting class E.

Members from towns of 10,000 or smaller may compete in any class, subject to the rules governing the same.

When one dimension of picture is given it applies to the length and breadth in all classes.

Ten marks to be the highest given for any one point, consequently thirty points is the highest that can be given to any one picture.

Class E.—In order to encourage improvement in every-day custom work, as against work made for exhibition purpose only, class E has been provided. The Board

hopes to see a large number of exhibits in this class, as it will more clearly than any other show the status of photography throughout the state.

In order to verify the work in this class, it will be required that the name of subject, and the date of sitting be legibly written under each picture.

We have some new ideas which will appear in our catalogue, which will be out about the last of October. If there is a photographer in the state who does not receive one, drop a card to the secretary, who will be glad to forward you one. Read over the prize list carefully, and select some class to enter, then go to work at once on your exhibit. We have secured the Russ Hall, which is the finest one in the state for that purpose. It is 150 x 50 ft., elegant light, and right in the centre of the town. Now do not say, "Well, I guess I will not go this year," but make up your mind that if there is any good to be derived from conventions I will receive my share. The Board will do all in their power to have you treated well, and to make this, our first convention, a success, and don't you think for a moment it is not going to be a success, but watch it go up among the greatest of all associations.

E. E. Seavy, *Secretary.*

PHOTOGRAPHERS' ASSOCIATION OF MICHIGAN.

The Photographers' Association of Michigan give notice that their next convention is to be held at Detroit, Mich., February, 1897. The following list of prizes is offered:

The most artistic novelty in photography, open to the world, 1 picture, 8x10 or over; one gold medal.

The Founders' Cup; three pictures, 8x10 and over.

Special prizes to photographers outside of Michigan; 1st, one gold medal; 2d, one silver medal.

Class A—six pictures, 13 inches and over; 1st, one gold medal; 2d, one silver medal; 3d, one bronze medal.

Class B—twelve pictures, Paris panel to 13 inches; 1st, one gold medal; 2d, one silver medal; 3d, one bronze medal.

Class C—twenty-four Paris panels; 1st, one silver medal; 2d, one bronze medal.

Class D—twelve cabinet photographs; 1st, one silver medal. Diplomas to all over 21 points.

Class E—six Paris panels and six cabinets; 1st, one silver meda

2d, one bronze medal. Competitors in Class E must be from towns of 5,000 and under.

Class F—twelve cabinets; 1st, one silver medal; 2d, one bronze medal. Class F must be from towns of 1,000 and under.

Class G—best group, 7 inch and larger; 1st, one silver medal; 2d, one bronze medal.

Class H—landscape, six pictures, 7 inch and over, with or without figures; 1st, one silver medal; 2d, diploma.

Class I—interiors, six pictures, 7 inch and over; 1st, one silver medal; 2d, diploma.

Class J—commercial work, six pictures, 7 inch and over; 1st, medal; 2d, diploma.

NOTES.—Classes A, B, C, D, E and F must be portraits. Each class must be displayed by itself. Class B—three pictures of this class must be over 10 inches. Exhibitors cannot compete in more than one class of A, B and C. Displays can be made on any kind of paper.

Founders' Cup—Rules will be the same as in last year's contest. Pictures in competition for the cup cannot be entered in any other class.

All pictures must be framed. The committee suggests a one inch oak frame for exhibits.

Begin at once on your negatives. Invite sitters for that purpose Don't stumble over technicalities. Let your eye determine the needs of your composition. Exercise it if you want to improve.

Members from towns of 5,000 or less can compete in any class, subject to the rules governing the same.

Photographers outside the state desiring to compete for specia prizes are required to accompany their entry with a fee of $2.00, thus becoming honorary members. J. E. Watson, Sec., 148 Woodward ave., Detroit.

As her eyes rested upon the patient figure of her husband her heart smote her.

"Dearest."

He started timidly, seemingly disconcerted by her unwonted manner.

"Dearest," she continued, tenderly, "those biscuits were better than mother used to make."

He was silent, but, as he finished washing the dishes and proceeded to sew a button on her bloomers, a glad smile irradiated his countenance.

A kindly word had lifted his burden.—*Detroit Tribune.*

Photographic Hints and Formulæ.

Albumen Paper.—Some practical hints for such as still use the old stand-by.

Silvering. Fifty grains of silver to one ounce of water. Float one or two minutes, according to temperature. Dry thoroughly, but not too quickly. Fume about thirty minutes. Have your fuming box warm and dry and use strong and fresh liquid ammonia. Dry paper again after fuming.

Toning. Before washing immerse the prints in a bath of acetic acid and water; one ounce acetic acid to sixteen ounces water. After having become decidedly red take them out and wash thoroughly.

No. 1. To one pint of distilled warm water add 160 grains of borax, 80 grains of bicarbonate of soda and 40 grains of double fused acetate of soda. Mix eight hours before using.

No. 2. Fifteen grains of chloride of gold to one and a-half ounces of distilled water.

Mix the whole of No. 1 with one-half ounce of No. 2 half an hour before using. Reserve half of the old bath for the next day, when it should be mixed with an equal quantity of a newly prepared gold bath.

Fixing. Seven pints of water, one pound of hypo and one ounce of carbonate of ammonia.

The daily use of fresh hypo, prepared with fresh lukewarm water, will prevent blisters and give clear, brilliant whites. Keep the papers dry and cool.

Before silvering, it should be removed to a slightly moist place, when it will absorb sufficient moisture to be fit for floating without trouble.

High surface papers are apt to blister, especially during warm weather. This can be easily and effectively prevented, however, by the following method given by Mr. C. R. Arnold, viz.:

First have your paper damp before sensitizing, so it will not roll from the bath. The bath must contain one drop of camphor to each sheet of paper, added several hours before using. If the bath turns yellow after ordinary clearing, add chloride of lime until after sunning the yellowness disappears. Print, wash and tone as usual.

To one pound of glycerine add a quarter ounce of ammonia and let it stand a few days before using.

Add one ounce of the above to every fifty ounces of your fixing solution. Afterwards fix fifteen minutes and immerse the prints in a weak solution of salt and water.

Reducing Solution.—Dissolve one part red prussiate of potash in fifteen parts of water. Wrap the bottle in yellow paper, to protect the solution from decomposition by light.

To a solution of one ounce hyposulphite of soda in fifteen ounces of water add from one-half to one ounce of the red prussiate solution immediately before use. Watch the negative carefully, avoiding strong light during the operation, and remove it to running water immediately when sufficiently reduced.

The final washing should be a thorough one, as the chemicals, especially the hypo, are very difficult to eliminate from a gelatine film. Let the plates remain at least an hour in running water. If no hydrant is at hand, wash an hour, changing the water frequently.

Electrolyzed Salt Water.—Extraordinary claims are being made for electrolyzed salt water, or hermitine, which has not only proven a useful disinfectant for sewage but is said to have been adopted as an antiseptic in Paris hospitals. According to Dr. Proger, of Asnieres, it is neither caustic nor irritating; it may be applied to the mucous membrane as to the skin; it instantly removes all bad odors, stops all putrescent fermentation, kills microbes more effectually and rapidly than any other antiseptic, cleanses and heals fetid wounds and sores, and is, in fact, an ideal antiseptic. He urges its advantages from a domestic point of view for deodorizing and cleaning, and from a medical point of view as an antiseptic and healer. He reports successful use of it in cases of angina, coryza, and incipient diphtheria.

If you must pass through what is even a desert to get to fertile, smiling lands beyond, still it is not good to count even the desert a mere necessary evil, to be got through and forgotten as soon as possible. It is good as you plod through the sand to feed you eyes with the vastness and simplicity of the world, which the monotony of sky and sand can most impressively display to you. So, if God has appointed to any of us times of solitude and friendlessness—perhaps times of unpopularity and neglect—let us pray that we may not pass through them, however dreary they may be, without bringing out from them greater conceptions of Him and of our fellow-men and of ourselves. —*Phillips Brooks.*

Society Notes.

Minneapolis Camera Club.—The Minneapolis Camera Club met on the evening of September 15th ult., at the I. E. Burt studio, and held the first of a series of regular meetings to run through the fall and winter. There were nearly fifty members present. The entertainment of the evening consisted of a stereopticon exhibition, in which over 100 views were shown, representing places and objects of interest and note in England.

C. J. Hibbard, secretary of the club, was lecturer of the evening, and explained the views as they were shown upon the screen. The views had been secured through the Lantern Slide Exchange, which includes the camera clubs of the leading cities of this country and England, and came direct from the Lantern Society of London. The views were fine, and the entertainment was an interesting one. The pictures included buildings and objects of historic interest, going back as far as the time of the Danes in England. The views were discussed from an artistic standpoint as exhibited.

California Camera Club.—The seventy-fourth illustrated lecture of the California Camera Club was delivered by Charles Albert Adams, in Metropolitan Temple, before an audience which filled the building to overflowing. The slides shown were especially made, colored and arranged in Japan for a private collection. Two artists worked a year in coloring them. Experts have pronounced them the finest ever produced. The collection includes slides showing not only beautiful temples and gateways with which the country abounds, but characteristic bits of Japanese life, dancing girls, mendicants, street scenes, children at play, holiday merrymakings, and the countless sights which go to make Japan a Mecca of the pleasure-seeking traveler. The lecture was prepared and delivered by Mr. Adams, and showed a familiarity with Japanese and their customs which was a revelation to those present. The speaker was frequently interrupted by applause. During the intermission Miss Lena Hackmeister sang "Flight of Ages" so well as to earn a recall.

She—"I don't think a little white lie is so very bad, do you?"

He—"Oh, no; but I wouldn't want anybody to call me a little white liar, all the same."

Photographic Scissors and Paste.

Definitions of Electrical Terms. — *Accumulator.*—Storage or secondary battery, in which electricity has been carried and has been converted into chemical energy, being retransformed into electricity when the battery is put to use for the purpose of furnishing energy or light.

Ampère. — The unit of the strength of the current per second. It represents, perhaps, the volume of electricity, and its value is the quantity of the fluid which flows per second through one ohm of resistance when impelled by one volt of electro-motive force.

Anode.—The positive pole of a battery.

Arc.—The space between the points of the carbons in an electric light or lamp which is bridged by the current represented by the flame.

Armature.—The revolving arm of an electric generator.

Battery.—A primary battery is one in which electricity is obtained through the decomposition of metals in chemical solutions. Zinc and copper may be the metals and sulphuric acid the chemical. Gold, silver, platinum, iron or tin may also be used as the metals and sal-ammoniac, bi-chromate of potash, nitric acid and sulphate of copper may also be used as the chemicals. The storage battery is a cell of acidulated water, containing, for example, plates of lead. This arrangement has an electric current directed into it, which it will give back in almost an equal quantity when the energy is wanted. There are various methods and ways of making both primary and secondary or storage batteries, but the above are the general principles governing their construction.

Brush.—The copper string which connects with the commutator of a dynamo and gathers the electricity for the conductors.

Candle.—Our unit of illuminating power.

Carbons.—Rods of carbon are used in arc lights for first establishing the current, and then, when withdrawn, form the arc over which the electric flame leaps. They are made of powdered coke by a secret process.

Cell.—The vessel in which chemical action produces electricity.

Circuit.—The path along which an electric current travels.

Commutator.—The collector of the electricity generated, and from which the fluid is taken by the brushes.

Condenser. — An arrangement for collecting a large quantity of electricity on a small surface.

Conductivity.—The comparative ability of a substance to convey a current of electricity.

Conductor.—Conveyers of the electric current, silver being the best, and copper next, in conductivity.

Core.—The iron that becomes magnetized in an electro-magnet. In helix, this iron is of the softest kind.

Coulomb. — The unit of dynamic quantity represented by one ampère of current.

Current.—The flow of electricity along a conductor. Its strength in ampères is found by dividing the electro-motive force in volts by the resistance in ohms.

Dynamo.—Machine for converting mechanical power into electrical energy.

Electrode.—A pole of a battery.

Electro-motive Force.—The power that constitutes or moves electricity.

Electro-magnet. — The soft iron core round which insulated wire is wound. It becomes highly magnetized when the current is sent through the coil, and is much more powerful than a permanent magnet, but its magnetism is lost when the current is broken.

Ferad.—The unit of electrical capacity.

Galvanometer.—An instrument for measuring an electric current and for detecting the presence of electricity.

Horse-power, Electrical.—A unit of power equaling 746 watts of electrical energy. A current of one ampère and 746 volts is an electrical horse-power.

Induction.—The property by which one body having electrical, galvanic or magnetic polarity causes it or induces it in another body without having actual contact. In other words, an impress of molecular force or conditions from one body on another without direct contact. An electric current in a wire induces currents in conductors parallel to it.

Insulators. — Substances possessing high resistance, such as glass, vulcanized rubber, paraffine, etc. When covering a wire along which an electric current is passing it prevents loss of power by induction, and makes the wires heavily charged safer for handling.

Joule.—The union of heat and work which is expended in forcing one coulomb through one ohm. It equals .7373 foot-pound.

Magnet.—A magnetized piece of iron or steel, capable of attracting iron or steel bodies, and of inducing electric currents.

Negative.—The terminal of a generator, where the positive current returns after traversing its circuit. Negative electricity is an amount less than the substance would naturally contain.

Ohm.—The unit of resistance represented by the resistance through which one ampère of current will flow at a pressure of one volt electro-motive force.

Polarity.—A magnet suspended so that its movements are unrestricted in any direction will turn one point to the North, the other to the South. Hence the North and South poles of the magnet.

Pole.—The terminal of a generator.

Positive.—The point of a generator where the positive current leaves it.

Potential.—Appliable electro-motive force corresponding to pressure or head in hydraulics.

Power.—The rate of doing work.

Resistance.—The opposition that a current meets in traversing a conductor.

Volt.—The unit of electro-motive force. One volt will force one ampère of current through one ohm of resistance.

Watt.—The units of electrical power represented by one volt multiplied by one ampère.

The units of electrical power, etc., are symbolized as follows:

Electric motive force of volt	E. M. F. or
Current or ampère	C.
Resistance or ohm	R.
Quantity or coulomb	Q.
Capacity or ferad	R.
Energy or joule	W.
Power or watt	P.

Results of Education.—Irate uncle, (to nephew in prison.) "Gallagher, I towld yez all along that ejucation 'd prove yer cur-r-rse, an' I am not a bit shurprised at yer bein' here. If yer hand't never learnt to wrote, yer had never bin arristed for forgery. Look at me wid no ejucation at all, can't even scarcely wroite me name, and has been an alderman an' a Police Justice. Yer could have done the same, but, no! yez must have an ejucation. Gallagher, I'm ashamed of you!"